Management of Hypoglycaemia in Children with Diabetes Mellitus

Reference: 963
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Purpose

Main purpose of this guideline is to guide the management of hypoglycaemia in children and young people with diabetes.

Intended Audience

This guideline applies to all registered nursing staff and clinicians working within Sheffield Children's Hospital involved in day to day care of the children and young people with diabetes.
1. Introduction

Anyone with Type 1 Diabetes Mellitus can develop hypoglycaemia which is an acute condition. It is defined as a blood sugar level of less than 4.0 mmols/l. A hypoglycaemic episode can occur at anytime or place. Each child will have their own unique symptoms of experiencing hypoglycaemia.

2. Intended Audience

As above

3. Guideline Content

**Definition** of hypoglycaemia in children with diabetes is a blood glucose < 4.0 mmol/L. (This nationally accepted ‘4 is the floor’ in diabetes provides a safety margin. It should not be confused with the lower level of 3.1 mmol/L used for patients without diabetes.)

The severity of hypoglycaemia can be categorised as mild or moderate and severe. Mild and moderate hypos should receive the same treatment as there is little clinical research to suggest they are separate entities.

**Mild or Moderate Hypoglycaemia**: child able to tolerate oral fluids / Dextrogel. See Page 4

**Note**: Mild hypos are not unusual and are harmless. One or two mild hypos a week are expected in a child with tight diabetes control.

**Severe Hypoglycaemia** Unconscious or fitting child requires parenteral therapy (IM glucagon or IV glucose). See Page 5

- **Signs and Symptoms of Hypoglycaemia (‘Hypo’)** vary between individuals and may change with age. A child/adolescent may exhibit some of the symptoms below, while others may have no symptoms.

- Hypoglycaemia may develop rapidly and is usually recognised by the child in the early stages. It must be treated promptly to prevent further deterioration.

Symptoms and signs can be classified into 3 groups: autonomic, neuroglyco-paenic and behavioural. *(The list is not exhaustive and if you suspect a child/adolescent is experiencing a hypo their capillary blood glucose MUST still be checked.)*
The symptoms of a hypo can be different for everyone and may not always feel the same to any individual.

**Remember:**
- Measure blood sugar level as soon as symptoms noted if possible
- An untreated hypo may lead to loss of consciousness.

**Exception:** If the child’s diabetes has not been well controlled they may experience the earlier signs of a hypo at a higher blood sugar level, e.g. between 4 and 11 mmol/l. They may feel unwell at this point but will not become unconscious at these levels. **Treatment is not required.**

**What causes hypoglycaemia?**
- Not enough food, delayed meal or lack of carbohydrate / starchy food
- Extra activity, sport, exercise,
- Too much insulin
- Hot weather
- Alcohol
- No obvious reason

**Treatment of hypoglycaemia**
Always treat hypo’s immediately.
The treatment varies with the degree of severity.

When a hypo has been identified **Mild to Moderate**, treatment plan as listed below (page 4) must be followed as quickly as possible. This will stop the symptoms and prevent the need for extra help.

**WE DO NOT RECOMMEND** chocolates, biscuits, milk, crisps and other foods as first-line treatments for a hypo. **This is because the fat content in these other foods means that the sugar is absorbed more slowly.**

Review history of hypo: If possible the cause should be identified and if necessary the insulin dose adjusted, e.g. for early morning/night-time hypo ask about extra exercise the evening before and details of bedtime snack.

**Treatment of Mild or Moderate Hypoglycaemia**

<table>
<thead>
<tr>
<th>Autonomic</th>
<th>Neuroglycoenaic</th>
<th>Behavioural</th>
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<tbody>
<tr>
<td>Pale</td>
<td>Headache</td>
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| Pale               | Headache                 | Irritability             |
| Sweating/clammy    | Confusion                | Mood change              |
| Hungry             | Weakness, lethargy       | Erratic behaviour        |
| Tremor             | Glazed expression        | Nausea                   |
| Restlessness       | Visual/speech disturbances| Combative behaviour      |
1. **Follow this box if child is co-operative and able to tolerate oral fluids**
   Give 10-20g of fast acting oral carbohydrate such as:
   - 3-5 dextrose tablets
   - 60 ml Glucojuice
   - 200 ml (~ ½ cup) sugary drink (not diet) such as cola (20g). Note Lucozade Sport (300ml = 20g)
   - 100mls of fruit juice

   **NB** Chocolate or milk WILL NOT bring glucose levels up quickly enough. Approximately 9 g of glucose is needed for a 30 kg and 15g glucose for 50kg child (0.3g/kg) - *ISPAD*

2. **Follow this box if child refuses to drink, is uncooperative, but is conscious**
   Give Dextrogel® (formerly known as Hypostop®). This is a fast acting sugary gel, in an easy twist top tube. Each tube contains 10g glucose. Squirt half of tube contents in the side of each cheek (buccal) and massage gently from outside enabling glucose to be swallowed and absorbed quickly. **DO NOT use dextrogel in an unconscious or fitting child.**

   **After 10-15 minutes recheck blood glucose:**
   1. If still low (<4 mmol/l) and able to take oral fluids repeat Box 1 above (once)
   2. If still low (<4 mmol/l), refuses to take oral but is conscious, follow Box 2 above (once)
   3. If deteriorated after first run through above or not responded after having administered 2nd dose of above then proceed to **Box 4 (See Page 5)**
   4. If clinically improved (feeling better) and blood glucose > 4.0 mmol/L follow Box 3 (see below)

   * (note: ISPAD recommends restoration of blood glucose level to 5.6 mmol/L)

3. **If feeling better and blood glucose level >4.0 mmol/L, There is no need for snack if eating within next 30 minutes.**
   If meal time is more than 45 mins- 2 hours away, give 10-15g slow acting carbohydrate snack such as:
   - One slice of toast
   - One piece of fresh fruit (not banana)
   - A cereal bar (max 15g carbohydrate)
   - One plain digestive or hobnob biscuit
   - Glass of milk (200ml)

   (*Patients on insulin pumps do not need extra snack as adjustment of basal rate (temporary basal) on pump or pump suspension for 30 mins might be enough*)

   Retest 20-30 minutes later to confirm target glucose (>4.0 mmol/L) is maintained.

   Treatment of hypoglycaemia should increase the blood glucose by approximately 3–4 mmol/L

   **DO NOT Omit** insulin with food if hypo has been treated just before mealtime and Blood glucose is > 4.0mmol/l.
Treatment of Severe Hypoglycaemia

Follow this page if child is unconscious or fitting (or also not responded from page 4)

CHECK CAPILLARY BLOOD GLUCOSE AND CONFIRM HYPOGLYCAEMIA (<4 mmol/l)

- Do involve medical assistance by this stage:
  - Outside hospital: call emergency services. Inside hospital: bleep Paediatric registrar
  - Place in the recovery position if possible and assess Airway Breathing Circulation
  - DO NOT attempt to give any oral fluid or Dextrogl®
  - If IV access is present go straight to box 5 instead of box 4

4. Give Glucagon (Glucagen) by Intramuscular injection

- Check if IM glucagon has been given at home or in ambulance. Check expiry date
- Administer intramuscularly or subcutaneously in the thigh.

**Dose:**
- Age <8 yrs or body weight <25 kg: 0.5 ml (half syringe)
- Age >8 yrs or body weight ≥25 kg: 1 ml (whole syringe)

Glucagon is a fast acting drug and the child/adolescent should respond after 5 minutes. After the child has regained consciousness leave him/her on one side as one of the common side effects of glucagon is nausea/vomiting

5. IV 10% Glucose

If recovery is not adequate after a dose of glucagon or IV access is readily available **AND** BG <4 mmol/l, then administer up to a maximum of 5mls/kg 10% dextrose as slow IV bolus. (*NICE 2015)*

**Note:** If alcohol has caused or contributed towards hypoglycaemia, glucagon may be ineffective (as hepatic stores of glycogen are depleted) and intravenous glucose will be required.

Further Monitoring after a Severe Hypoglycaemia:

- Check blood glucose after 5 minutes, 15 minutes and then half hourly until BG stable
- Continue to monitor baseline observations: oxygen saturation, pulse, blood pressure, temperature
- Record presence of or absence of blood ketones.
- Document management

If blood glucose >4.0 mmol/l and child able to tolerate oral fluids:

- Offer clear fluids, and once tolerating clear fluids offer complex carbohydrates, such as toast, crackers (see Box 3, Page 2)
- Try to identify the cause of hypoglycaemia and discuss this with the patient/family
- Refer to diabetes team for review of treatment, advice or education

If child not improving:

- If patients have protracted vomiting and are unable to tolerate oral fluids, hospital admission and IV glucose infusion must be considered, especially if a child has returned to the emergency department with further hypoglycaemia during the same intercurrent illness.
After a severe hypo the child will have depleted liver stores of glycogen. They are therefore at increased risk of further severe hypoglycaemia in the next few days. Warning symptoms of early hypoglycaemia are also blunted after a severe hypo. It is always sensible therefore to reduce subsequent insulin doses for at least the next 48 hours.

Always contact the Diabetes Team following a major hypo.

4. References
   NICE (2015) Diabetes (type 1 and type 2) in children and young people. NICE guideline NG18  [www.nice.org.uk/guidance/ng18](http://www.nice.org.uk/guidance/ng18)